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PRELIMINARY  
WEIGHT AND BALANCE REPORT  
FOR  
BOILERPLATE 30  
CONTRACT NAS 9-150  
(U)

1 JULY 1965

Exhibit I, Paragraph 8.10

Prepared By  
Weight Control

~~DOWNGRADED AT 3 YEAR INTERVALS  
DECLASSIFIED AFTER 12 YEARS  
DOD DIR 5200.10~~

**CLASSIFICATION CHANGE**  
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TECHNICAL REPORT INDEX/ABSTRACT

ACCESSION NUMBER				DOCUMENT SECURITY CLASSIFICATION Confidential			
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ABSTRACT

The preliminary weight and balance report for Boilerplate No. 30 presents summary mass property data and summary weight statements for each module. In addition; weight distribution for the Launch Escape System, Command Module (BP 18), Service Module and Adapter and graphs representing weight versus centers of gravity and moment of inertia for the Launch Escape vehicle during jettison motor burning are also contained in this report.

INTRODUCTION~~CONFIDENTIAL~~

This preliminary weight and balance report is submitted per paragraph 2.4.3 of NASA requirements Document ASPO-PS5-13-12 as deviated by attachment "A" of enclosure to NAA Letter 65MA5254, Dated 7 May 1965, and is representative of the CSM end items for Boilerplate 30. The data contained in this report is consistent with the requirements of SID 64-1083, CSM End Item Specification, Part I, performance/design requirements Boilerplate 30, Apollo, 19 April 1965. The lunar excursion module weight utilized is 32,000 pounds, excluding crew, per NASA-MSD Document PS5/L203-65-613, NAA/SID number 6746MA dated 3 June 1965.

This report consists of a complete Spacecraft LEM Adapter (SLA), modified Launch Escape System (LES), Command Module (CM), Service Module (SM) and control weight Lunar Excursion Module (LEM); to support mission 206A. The primary objective of mission 206A is to place the LEM into earth orbit for unmanned LEM propulsion testing. The S-1B will be the boost vehicle and the LES jettison motor will be used to jettison the LES, CM and SM as a unit. The SLA panels will be deployed simultaneously with the SM/SLA separation, and the LEM will then effect separation by utilizing the LEM reaction control system.

The LES consists of a modified Launch Escape Tower, normal spacecraft heat protection, an empty Launch Escape motor casing with a machined aft closure to remove excess weight, a live tower jettison motor assembly and a "Q" Ball.

The CM is Boilerplate 18 with equipment and instrumentation deleted and all unnecessary secondary structure removed, however, vent and purge provisions and heat protection insulation will be provided.

The SM is a structural shell stripped of all systems and as much secondary structure as practical.

The Spacecraft LEM Adapter is a complete unit and in addition contains an allowance of 120 pounds for the sequencer units, pyro batteries and R&D Antenna System associated with the Boilerplate 30 Mission.

The electrical provisions listed for the SM and CM is that associated with the "Q" Ball and the LES jettison motor.

The only Government Furnished Equipment onboard is the 25 pound "Q" Ball associated with the Launch Escape System.

Pages 2 through 4 reflect the mass properties summary for the individual modules and the spacecraft launch and flight conditions.

Page 5 lists the summary weight statements for the various modules.

Pages 6 through 9 chart the weight distributions for the LES, CM, SM and Adapter.

The powered flight mass properties of the Command and Service Modules and Launch Escape System with jettison propellant is summarized and charted on pages 10 through 16.

A diagram of Boilerplate 30 is shown on page 17.

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MODULE MASS PROPERTIES SUMMARY

ITEM	WEIGHT	CENTERS OF GRAVITY*			MOMENTS OF INERTIA**		
		X	Y	Z	Ixx	Iyy	Izz
LAUNCH ESCAPE SYSTEM	2520	1281.3	0.0	-0.3	161.4	5386.5	5389.9
COMMAND MODULE	3950	1039.1	0.0	0.2	2412.1	2007.8	2012.4
SERVICE MODULE	2035	916.6	0.4	-0.6	1971.2	2538.8	2473.8
ADAPTER RING	75	837.1	0.0	-1.8	93.3	47.6	45.7
ADAPTER AFT SECTION	1320	544.0	0.0	-1.3	4288.5	2445.0	2404.8
ADAPTER FWD SECTION	2405	697.9	1.1	-3.0	5048.6	5762.6	5505.5
SPACECRAFT LEM ADAPTER	3800	647.2	0.7	-2.4	9431.2	13209.3	12909.8
LUNAR EXCURSION MODULE	32000	586.5	0.0	0.0	21400.0	23350.0	23450.0

NOTE: \*Centers of gravity are given in the Apollo Vehicle Reference System as defined by MD-V14-14-10.

\*\*Moments and products of inertia units are slug feet squared about the center of gravity.

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SPACECRAFT MASS PROPERTIES SUMMARY

LAUNCH CONDITION

ITEM	WEIGHT	CENTERS OF GRAVITY*			MOMENTS OF INERTIA**		
		X	Y	Z	Ixx	Iyy	Izz
LAUNCH ESCAPE SYSTEM	2520	1281.3	0.0	-0.3	161.4	5386.5	5389.9
COMMAND MODULE	3950	1039.1	0.0	0.2	2412.1	2007.8	2012.4
SERVICE MODULE	2035	916.6	0.4	-0.6	1971.2	2538.8	2473.8
ADAPTER RING	75	837.1	0.0	-1.8	93.3	47.6	45.7
TOTAL	8580	1079.4	0.1	-0.2	4638.3	46129.8	46070.7
LEM ADAPTER (LESS RING)	3725	643.4	0.7	-2.4	9338.0	12566.0	12269.0
LUNAR EXCURSION MODULE	32000	586.5	0.0	0.0	21400.0	23350.0	23450.0
TOTAL - LAUNCH	44305	686.7	0.1	-0.2	35380.8	438518.7	438258.8

NOTE: \*Centers of gravity are given in the Apollo Vehicle Reference System as defined by MD-VL4-14-10.

\*\*Moments and products of inertia units are slug feet squared about the centers of gravity.

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SPACECRAFT MASS PROPERTIES SUMMARY

FLIGHT CONDITION

ITEM	WEIGHT	CENTERS OF GRAVITY*			MOMENTS OF INERTIA**		
		X	Y	Z	Ixx	Iyy	Izz
LEM ADAPTER - 45 DEGREE***	3713	629.0	1.4	-4.6	26157.0	18173.0	17362.0
LUNAR EXCURSION MODULE	****32000	586.5	0.0	0.0	21400.0	23350.0	23450.0
TOTAL - FLIGHT	35713	590.9	0.1	-0.5	47573.6	42835.3	42110.5

NOTE: \*Centers of gravity are given in the Apollo Vehicle Reference System as defined by MD-VL4-14-10.

\*\*Moments and products of inertia units are slug feet squared about the centers of gravity.

\*\*\*12 pound shape change is expended during SLA panel deployment.

\*\*\*\*LEM weight increased from 29,500 pounds to 32,000 pounds per CCA No. 290.

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~~CONFIDENTIAL~~SUMMARY WEIGHT STATEMENT

LAUNCH ESCAPE SYSTEM		2520
Structure & Insulation	1910	
Q-Ball & Attachments (GFE Q-Ball 25 Lb)	30	
Propulsion Jettison Motor Only	530	
Electrical Provisions	50	
COMMAND MODULE		3950
Structure	3930	
Electrical Provisions	20	
SERVICE MODULE		2035
Structure	2010	
Electrical Provisions	25	
ADAPTER		3800
Basic Adapter	3680	
Antenna System	70	
Sequencer and Electrical Provisions	50	
* LUNAR EXCURSION MODULE		32000

\*LEM weight increased from 29,500 pounds to 32,000 pounds per CCA No. 290.

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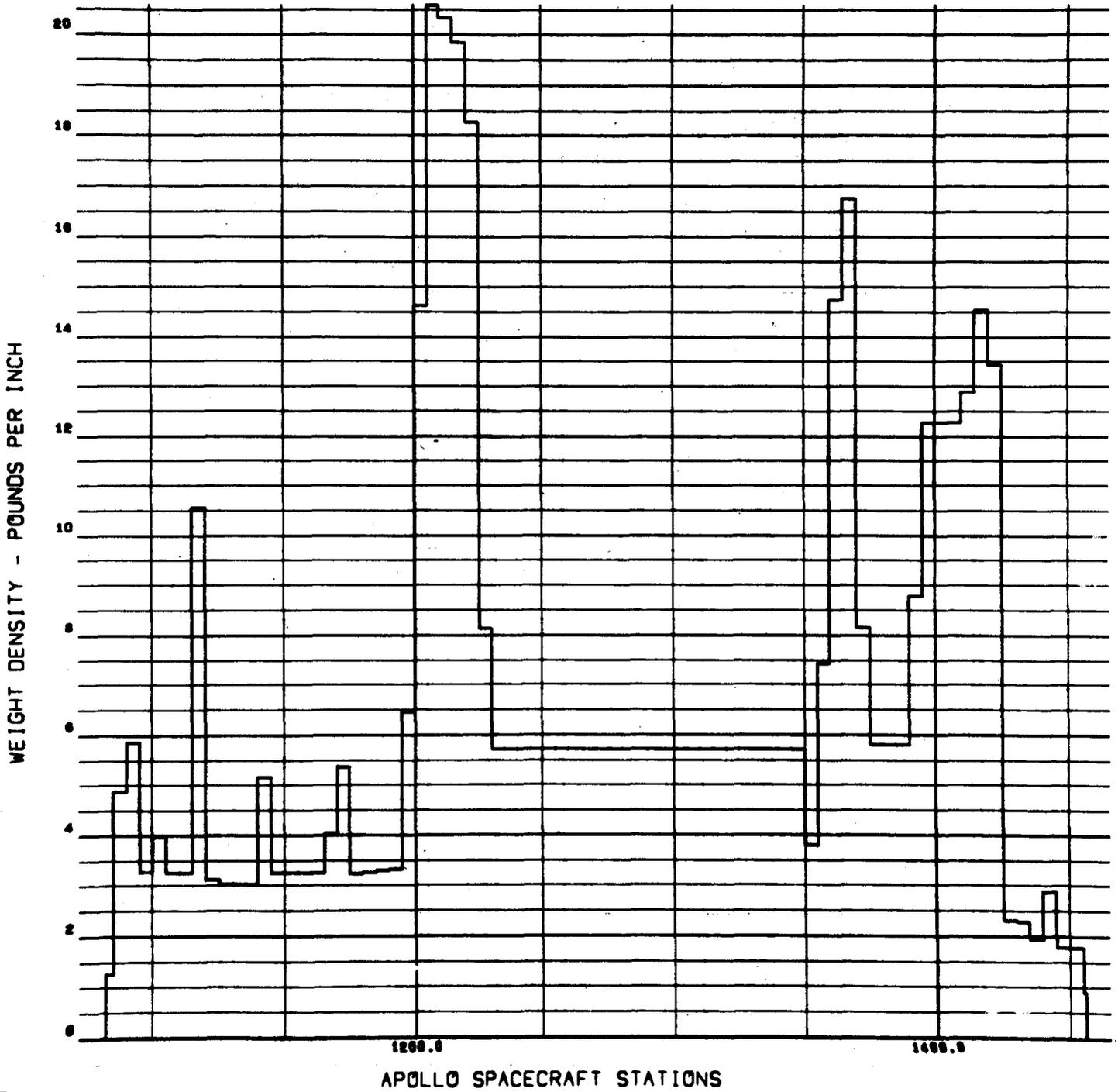
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LAUNCH ESCAPE SYSTEM

GROSS WEIGHT

V15 3 1

2004-10  
001 000



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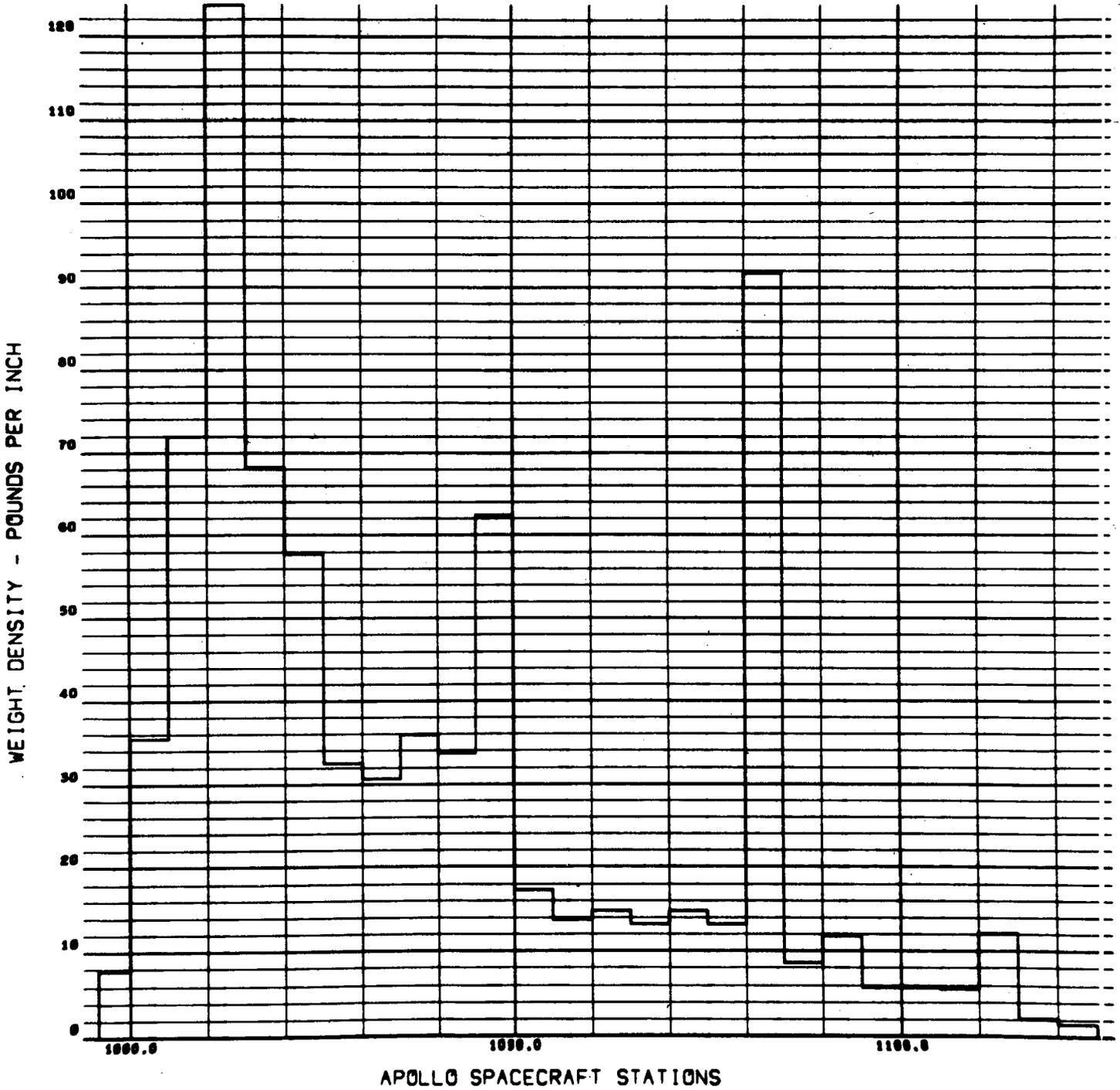
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COMMAND MODULE

GROSS WEIGHT

V16 2 18

2464-28  
001 000



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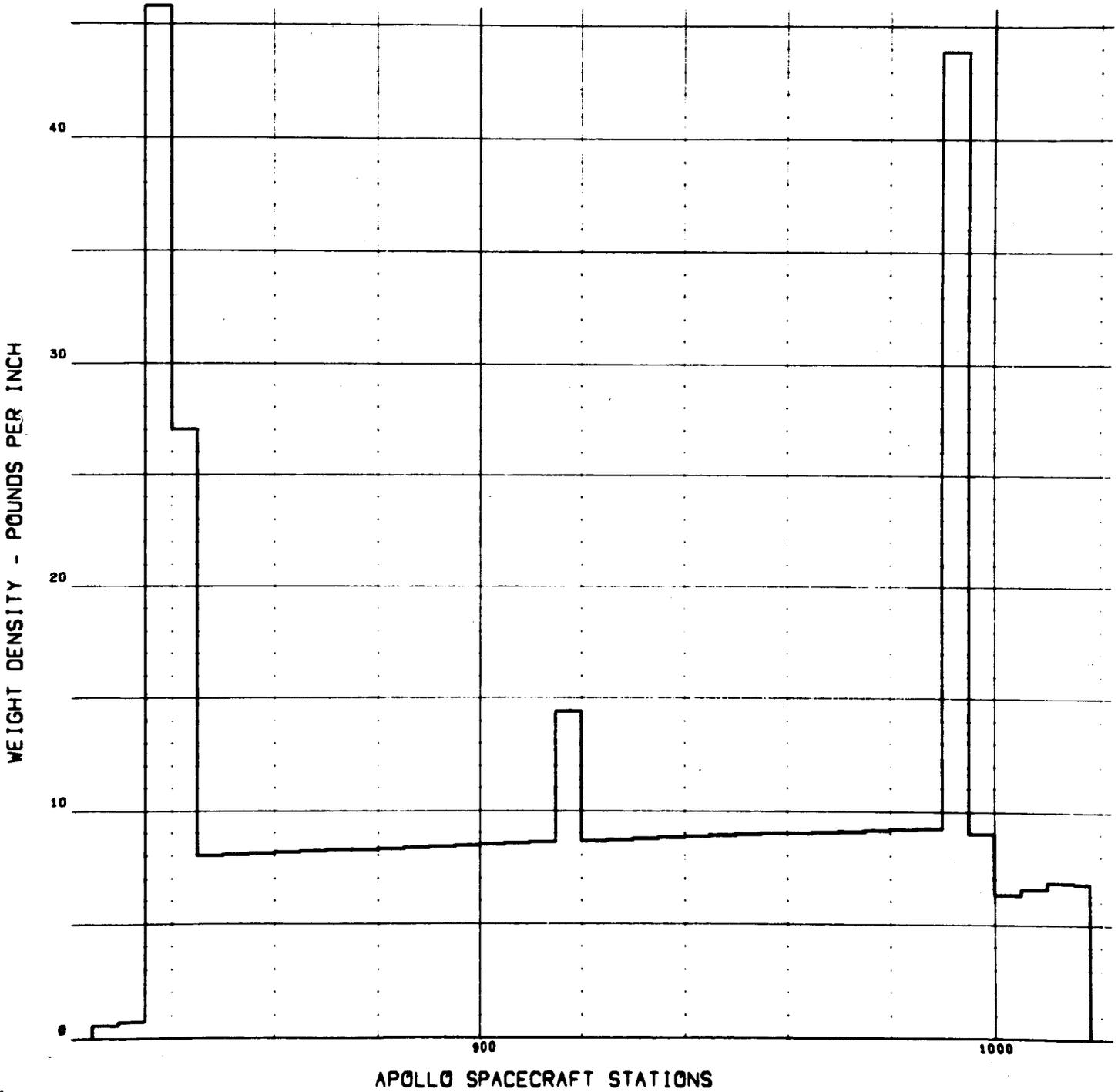


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S/C 015 SERVICE MODULE

WEIGHT DISTRIBUTION RUN

9022-27  
001 000



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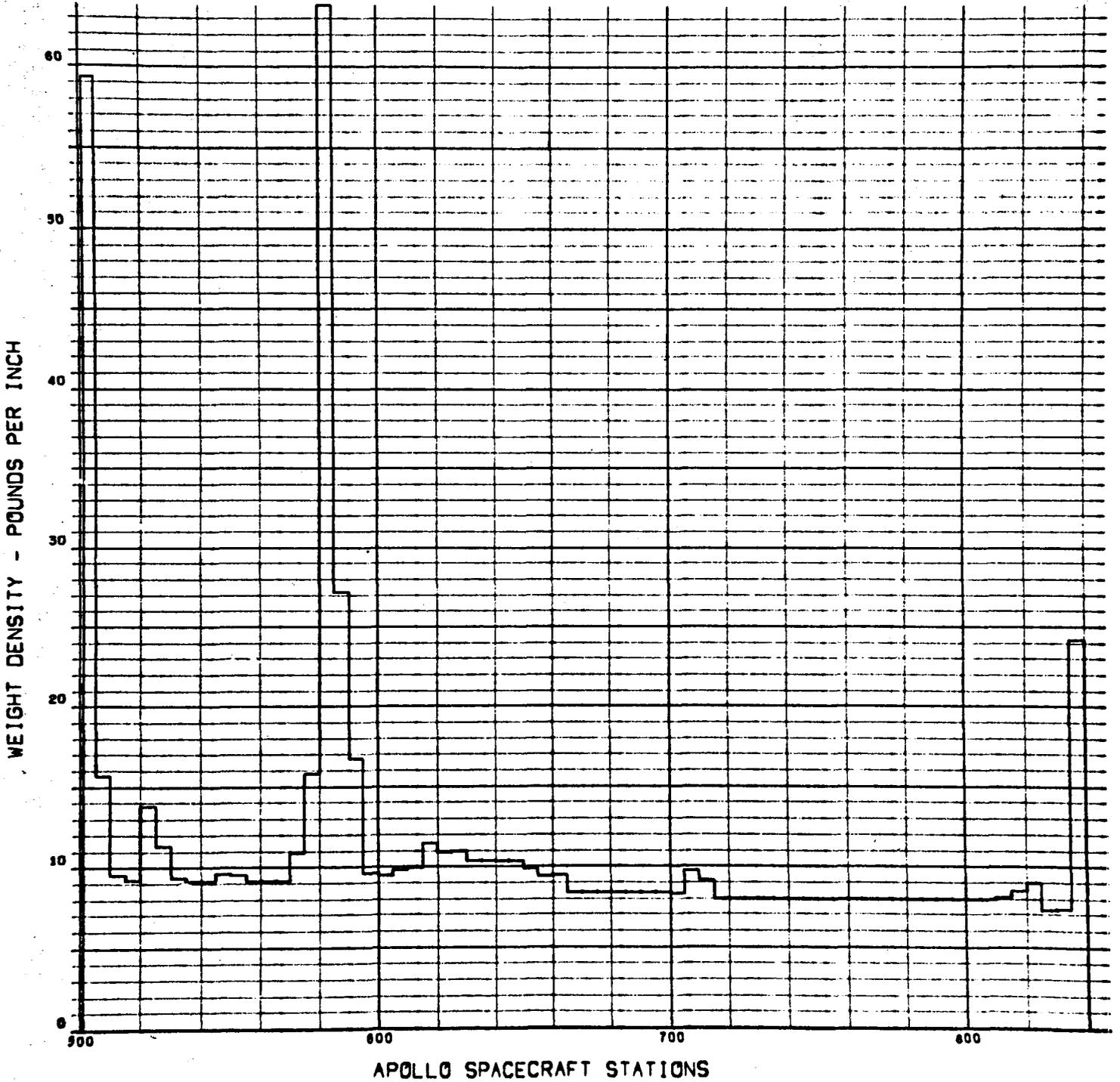
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ADAPTER

GROSS WEIGHT

V24 3 98

0623-30  
002 000



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BP 30 LES JETTISON BURNING WITH CSM AND SLA RING

TIME SECONDS	WEIGHT	CENTERS OF GRAVITY*			MOMENTS OF INERTIA**		
		X	Y	Z	Ixx	Iyy	Izz
0.0	8580.0	1079.4	0.1	-0.2	4638.3	46129.8	46070.7
0.2	8557.8	1078.6	0.1	-0.2	4637.7	45608.3	45549.1
0.4	8524.9	1077.3	0.1	-0.2	4636.7	44830.3	44771.1
0.6	8488.4	1075.9	0.1	-0.2	4635.6	43960.1	43901.0
0.8	8451.9	1074.4	0.1	-0.2	4634.5	43082.5	43023.3
1.0	8417.9	1073.1	0.1	-0.2	4633.4	42258.0	42198.8
1.2	8385.9	1071.8	0.1	-0.2	4632.3	41476.0	41416.8
1.4	8374.7	1071.3	0.1	-0.2	4631.9	41200.8	41141.7

NOTE: \*Centers of gravity are given in the Apollo Vehicle Reference System as defined by MD-V14-14-10.

\*\*Moments and products of inertia units are slug feet squared about the centers of gravity.

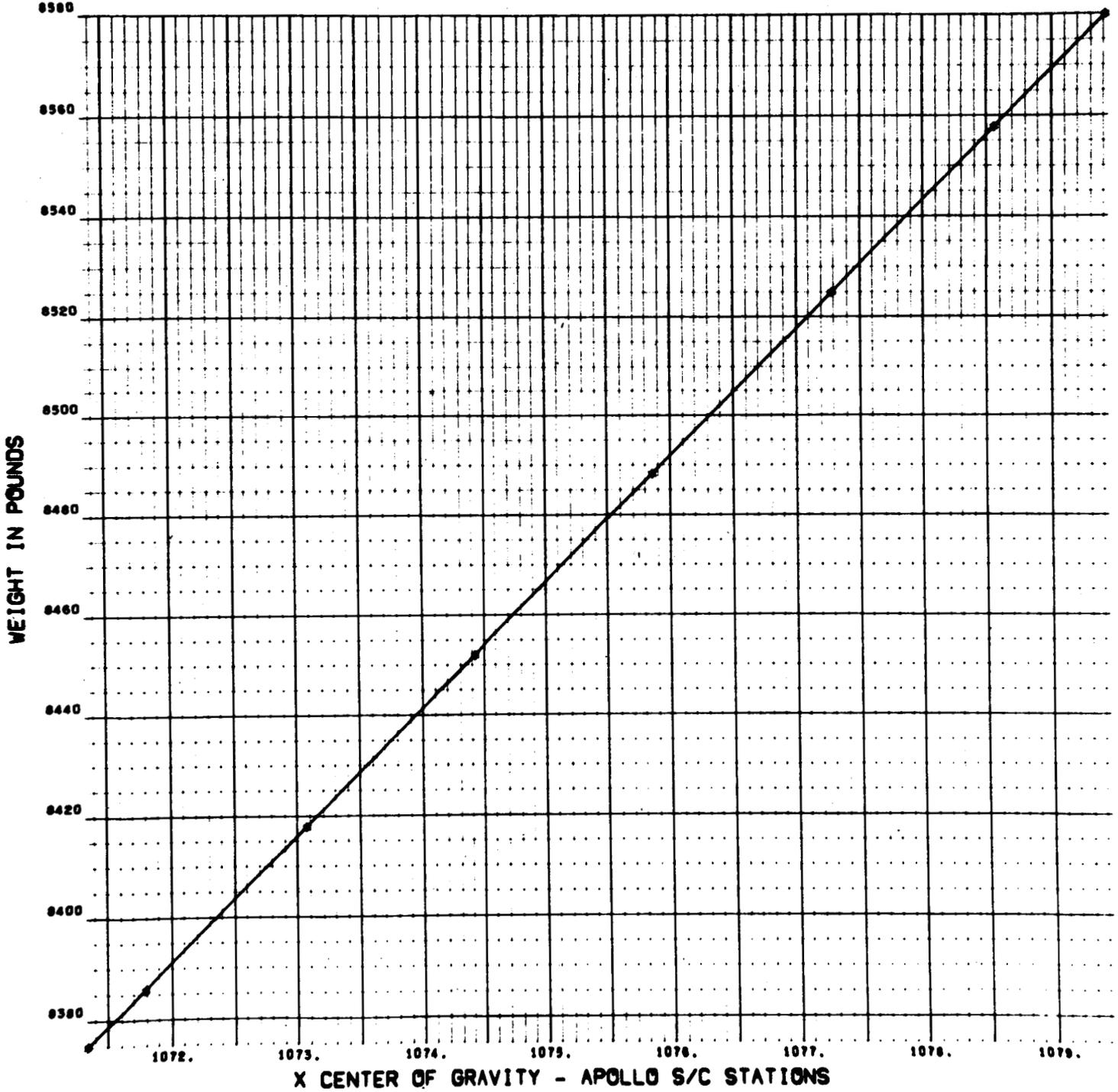
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BP 30 LES JETTISON BURNING W/ CSM + SLA RING

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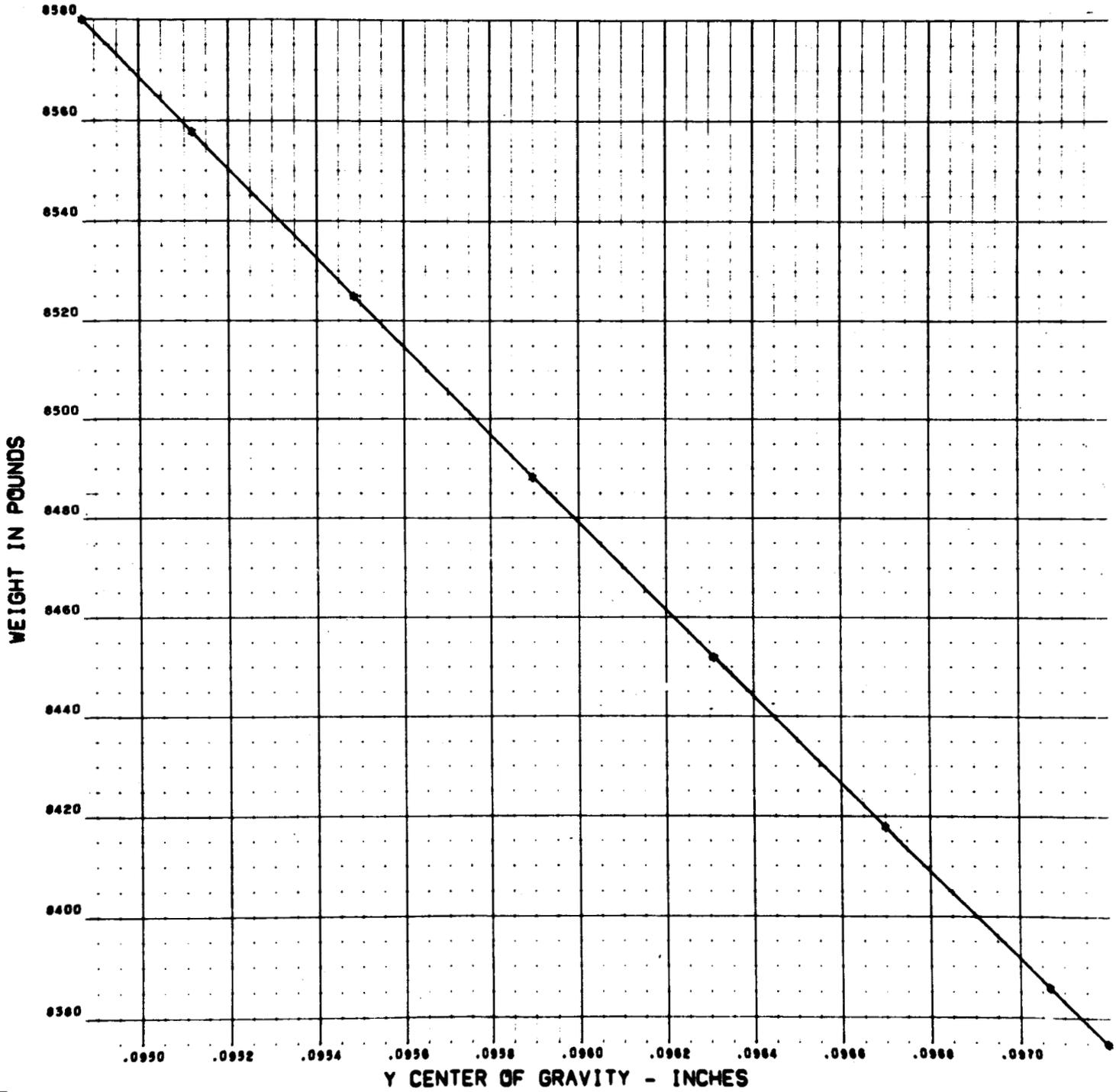
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BP 30 LES JETTISON BURNING W/ CSM + SLA RING

0422-02  
002 000



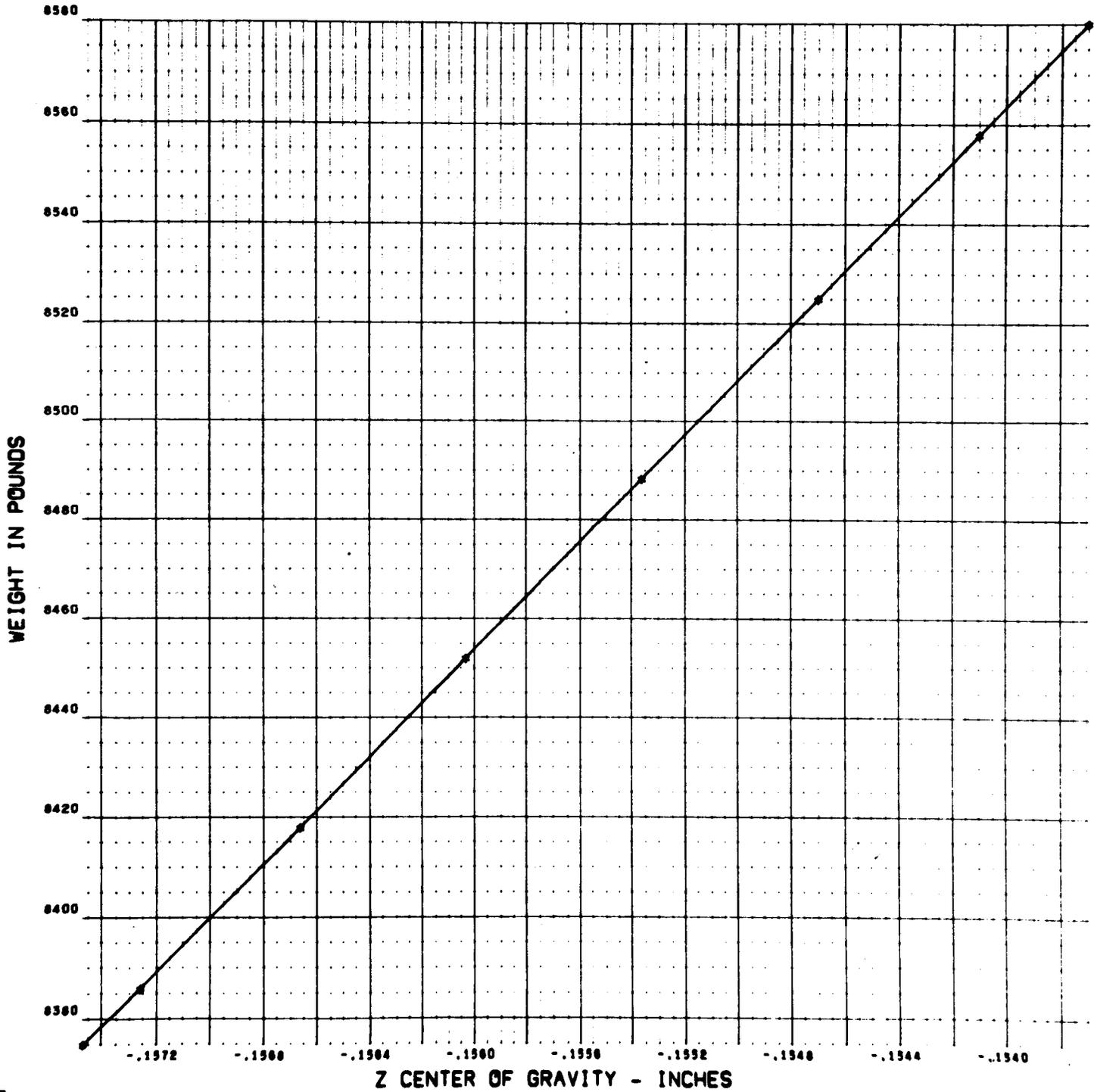
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BP 30 LES JETTISON BURNING W/ CSM + SLA RING

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003 000



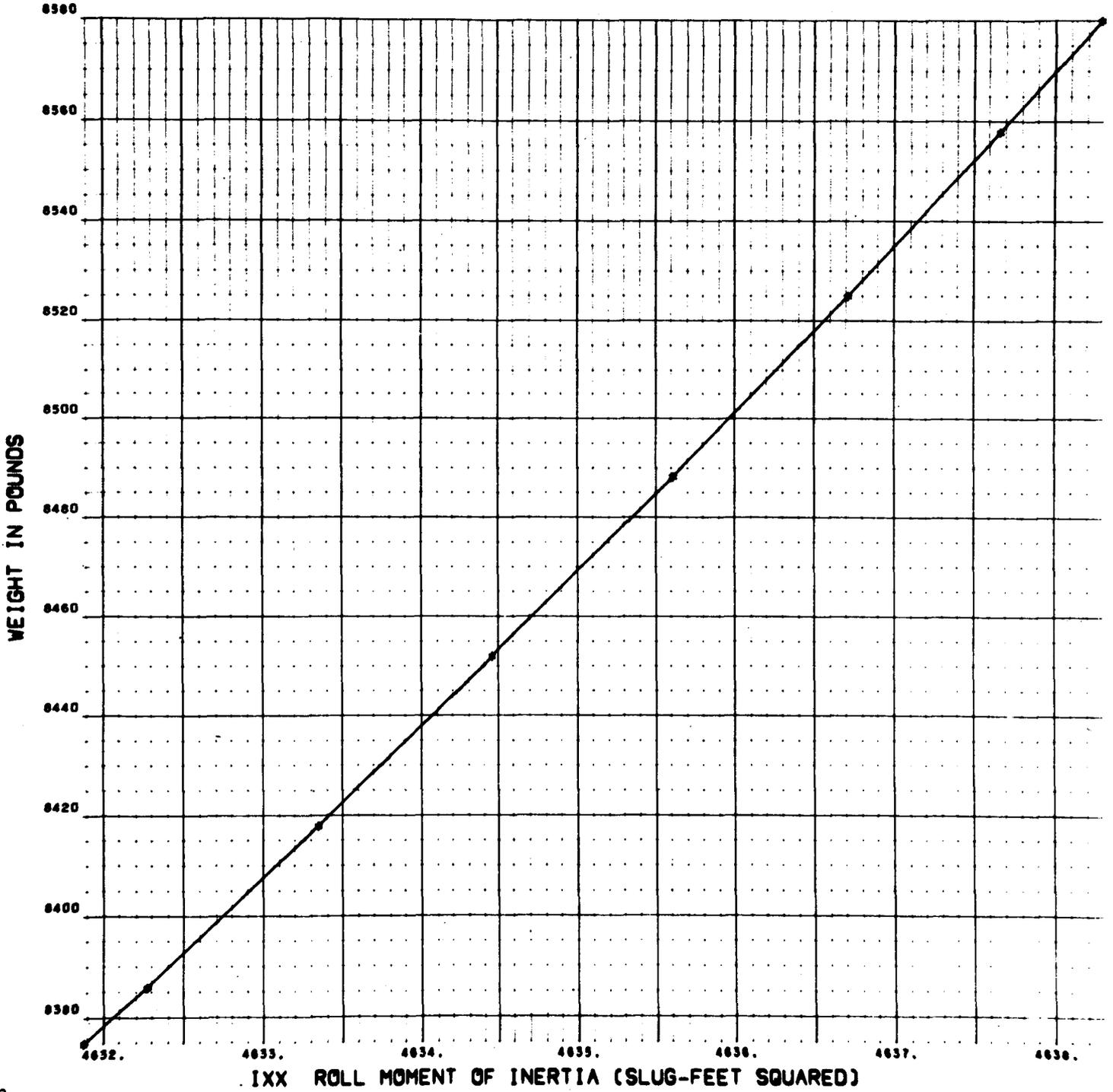
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BP 30 LES JETTISON BURNING W/ CSM + SLA RING

0022-02  
004 000



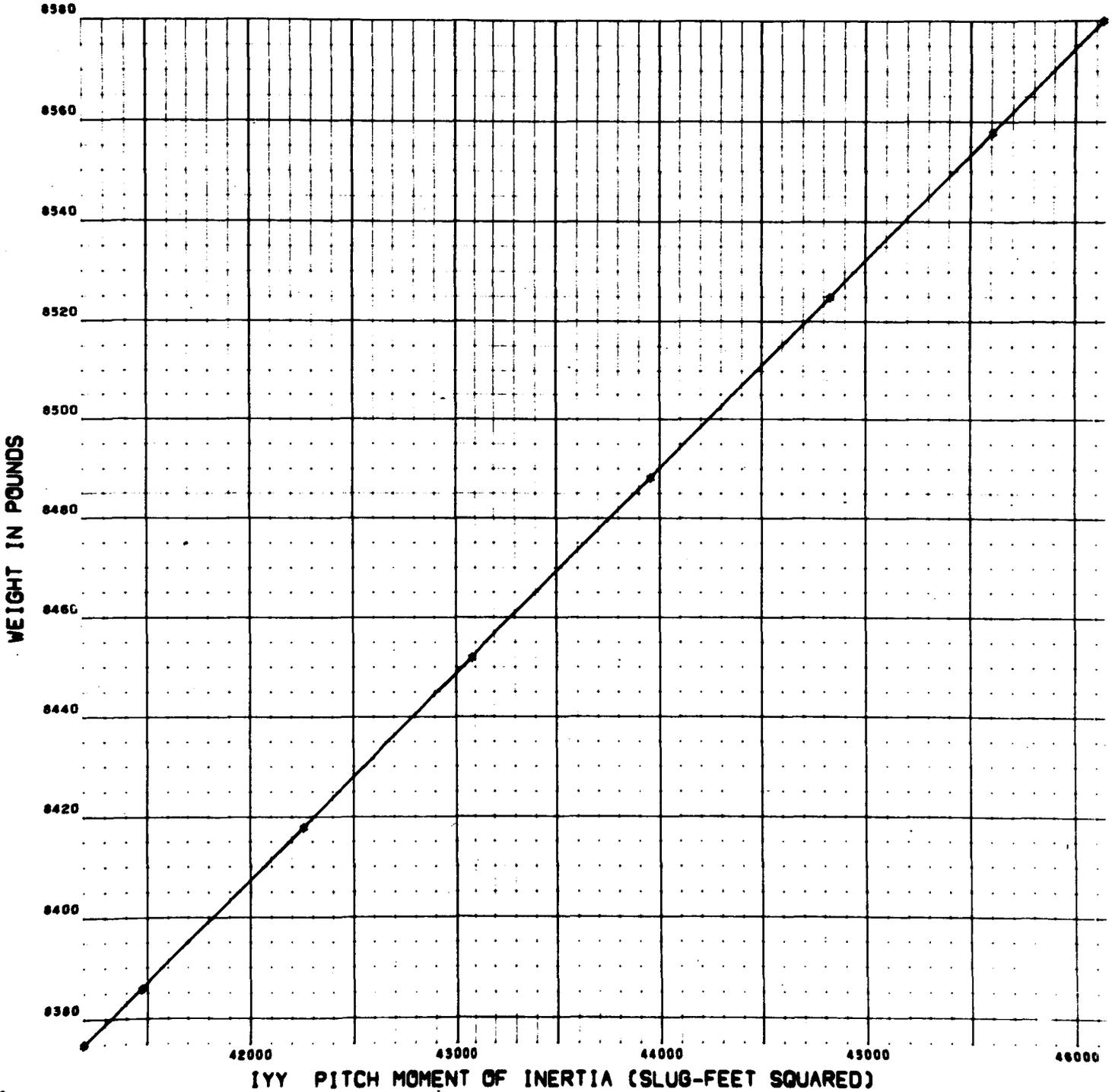
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BP 30 LES JETTISON BURNING W/ CSM + SLA RING

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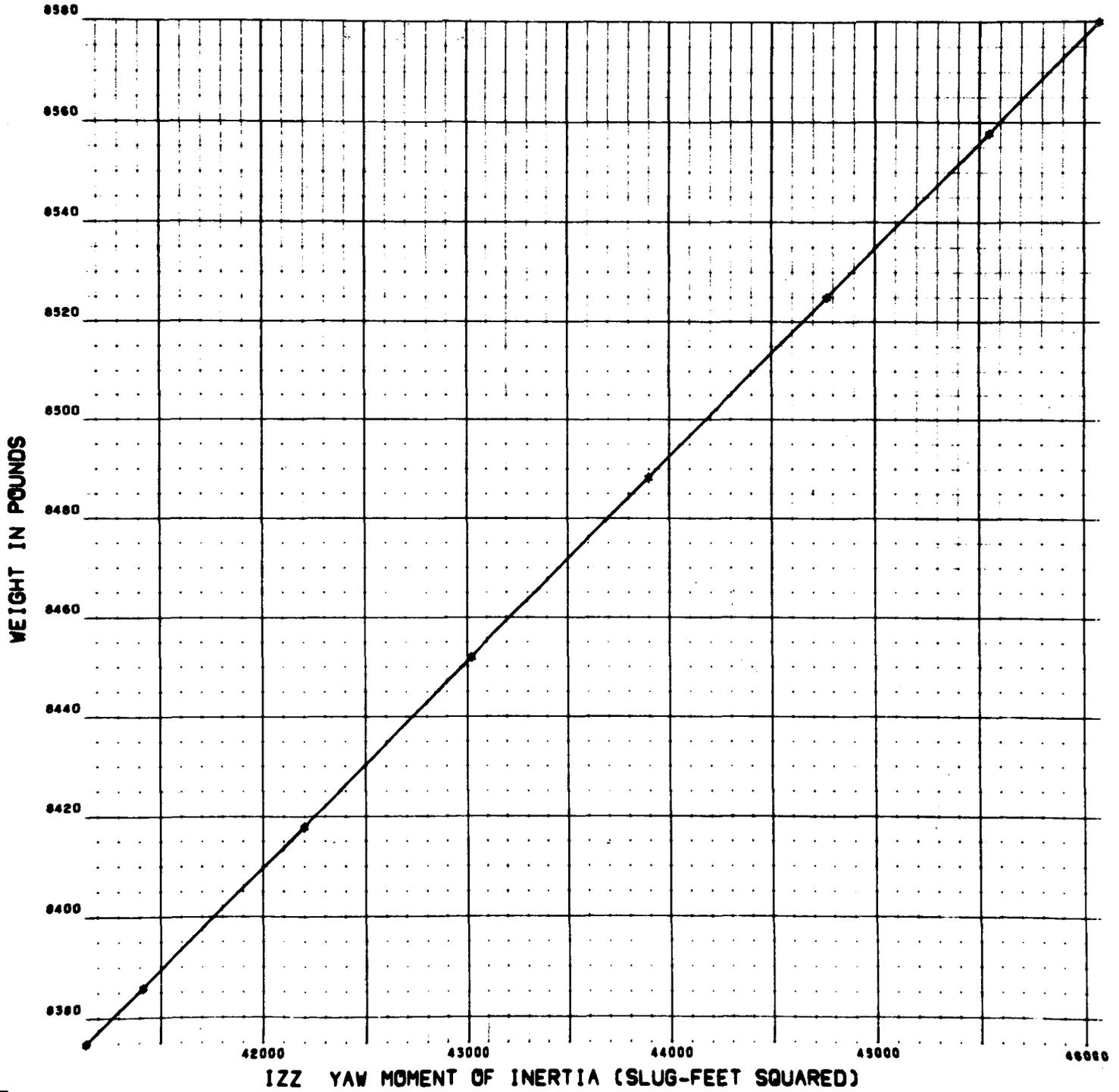
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BP 30 LES JETTISON BURNING W/ CSM + SLA RING

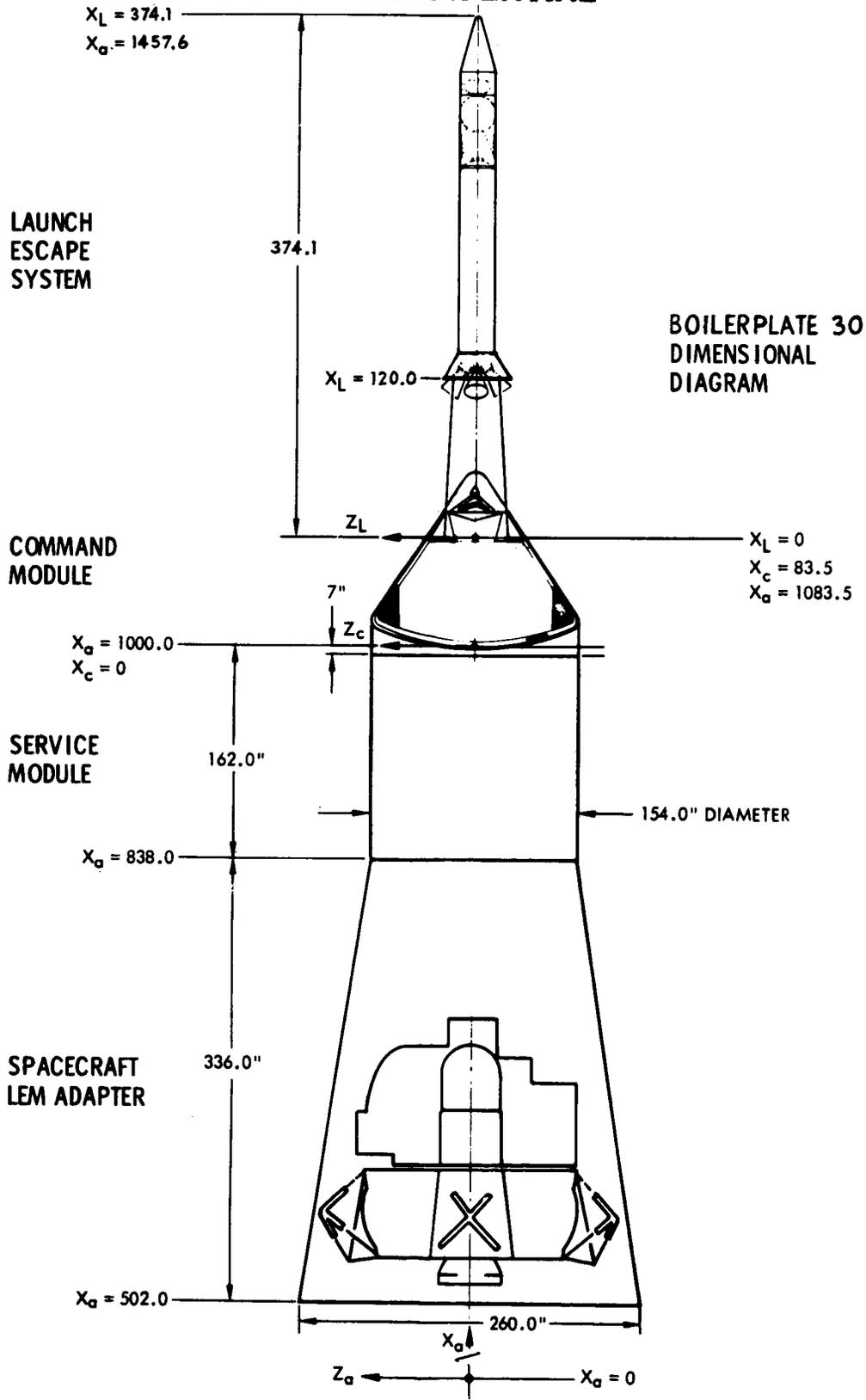
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